(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平9－141291

(43)公開日　平成9年(1997)6月3日

(51)Int.Cl.⁶	識別記号	庁内整理番号	ＰＩ		技術表示箇所
C02F 3/30			C02F 3/30	A	
B01D 63/08			B01D 63/08		
65/02	520		65/02	520	
C02F 1/44			C02F 1/44	C	

審査請求　未請求　請求項の数2　ＯＬ　（全５頁）

(21)出願番号　特願平7－299476

(22)出願日　平成7年(1995)11月17日

(71)出願人　000001052
株式会社クボタ
大阪府大阪市浪速区敷津東一丁目２番47号

(72)発明者　竹下　修
大阪府大阪市浪速区敷津東一丁目２番47号
株式会社クボタ内

(72)発明者　西岡　容一
大阪府大阪市浪速区敷津東一丁目２番47号
株式会社クボタ内

(72)発明者　秋田　淳司
大阪府大阪市浪速区敷津東一丁目２番47号
株式会社クボタ内

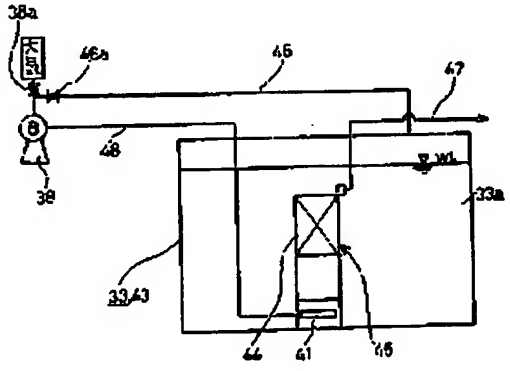
(74)代理人　弁理士　森本　義弘

(54)【発明の名称】　水処理装置

(57)【要約】

【課題】　膜カートリッジの膜面を空気等の気体により洗浄するに際し、被処理水中にＮＯｘやＮＨ，－Ｎの増大が生じない低酸素濃度の気体を供給することができ、被処理水の流入量の変動に対しても、曝気強度を変更することなく酸素濃度を変更できるようにする。

【解決手段】　槽体４３を密閉式に形成し、槽内上部空間に滞留する排ガスを散気管４１に循環供給する吸引管４６を設けて、排ガスを含んだ膜面洗浄用気体が散気管４１より噴出する嫌気状態下に被処理水を膜分離するように膜分離槽３３を構成する。



22　嫌気反応槽
33　膜分離槽
33a　処理水
38　ブロワ
41　散気管
43　槽体
44　膜カートリッジ
46　吸引管

1

【特許請求の範囲】

【請求項１】　処理槽の内部に、被処理水を膜分離する膜カートリッジを設け、膜カートリッジの下方に膜面洗浄用気体を噴出する散気手段を設けた水処理装置において．前記処理槽を密閉式に形成し、槽内上部空間に滞留する排ガスを散気手段に循環供給する循環手段を設けて．排ガスを含んだ膜面洗浄用気体が散気手段より噴出する嫌気状態下に被処理水を膜分離するように構成したことを特徴とする水処理装置。

【請求項２】　有機性排水を好気性槽と嫌気性槽とにおいて処理した生物処理水を膜分離するものであることを特徴とする請求項１記載の水処理装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は．処理槽の内部に被処理水を膜分離する膜カートリッジを設けた水処理装置に関する。

【０００２】

【従来の技術】たとえば．し尿等の有機性排水を処理する水処理設備においては．図３および図４に示したように．処理槽１の内部に、被処理水２を膜分離する膜分離装置３を設置している。

【０００３】膜分離装置３は、上下が開口した箱状の膜ケース４の内部に平板状の膜カートリッジ５を適当間隔で並列に配置し．同じく上下が開口した箱状の散気ケース６の内部に．槽外のブロワ７などの空気供給源に連通した散気管８を配置し、膜ケース４と散気ケース６とを互いに上下に配置することにより構成されている。

【０００４】膜カートリッジ５は、濾板９の両表面に有機濾過膜１０を配置し、濾板９と濾過膜１０との間に連通する透過水流路（図示せず）を濾板９に形成し．透過水流路に連通する吸引チューブ１１と集水管１２を設けることにより構成されている。そして．集水管１２に連通するように．透過水管１３や吸引ポンプ１４などの吸引手段が設けられている。

【０００５】このような構成において．膜分離装置３により被処理水２を膜分離する際には．吸引ポンプ１４によって透過水管１３，集水管１２，吸引チューブ１１を通じて膜カートリッジ５の透過水流路に吸引圧を負荷することにより．あるいは膜カートリッジ５より上方の被処理水２の水頭を濾過駆動圧とすることにより．被処理水２中に含まれる活性汚泥などの懸濁物質を濾過膜１０で捕捉し、濾過膜１０を透過して透過水流路内に流入した透過水を吸引チューブ１１，集水管１２，透過水管１３を通じて処理槽１の外部へ取り出している。

【０００６】このとき、ブロワ７により散気管８の散気孔８ａを通じて曝気し、曝気空気の気泡により生起される気液混合上昇流を膜カートリッジ５．５間の間隙に流入させて膜カートリッジ５の膜面全体を均一に撹洗し、濾過膜１０の表面にケーキ層が堆積するのを防止している。

2

【０００７】

【発明が解決しようとする課題】ところが、膜面洗浄に必要な曝気強度が５m³／m²と高いため、生物処理を終えた生物処理水など、窒素を含んだ被処理水を膜分離する場合には．曝気空気より被処理水中に溶解した酸素によって被処理水中に存在しているＮＨ₄－Ｎが酸化され．ＮＯｘが増大し易いので、水素源としてのメタノールを注入しながら脱窒処理する必要がある。

【０００８】また、処理槽への被処理水の流入量が減少しても、膜面洗浄のための曝気強度を低減することができないので、上記と同様にＮＯｘが増大することになり．水質が悪化する。

【０００９】そこで、酸素不含の気体により膜面洗浄することが考えられるが、完全嫌気状態にすると被処理水中に存在しているＮＯｘが還元されてＮＨ₄－Ｎが溶出してくるので．８～１０％程度の酸素を含んだ気体を用いることが必要である。

【００１０】撹拌機により槽内旋回水流を生起して膜面洗浄することも考えられるが、撹拌機では、膜面洗浄効果や被処理水中の窒素を放出させる効果が十分でないので．上記した理由により．酸素を含んだ気体による膜面洗浄が必要である。

【００１１】本発明は上記課題を解決するもので．膜カートリッジの膜面を空気等の気体により洗浄するに際し．被処理水中にＮＯｘやＮＨ₄－Ｎの増大が生じない低酸素濃度の気体を供給することができ、被処理水の流入量の変動に対しても、曝気強度を変更することなく酸素濃度を変更できる水処理装置を提供することを目的とするものである。

【００１２】

【課題を解決するための手段】上記課題を解決するために．本発明の水処理装置は．処理槽の内部に、被処理水を膜分離する膜カートリッジを設け．膜カートリッジの下方に膜面洗浄用気体を噴出する散気手段を設けた水処理装置において．前記処理槽を密閉式に形成し．槽内上部空間に滞留する排ガスを散気手段に循環供給する循環手段を設けて．排ガスを含んだ膜面洗浄用気体が散気手段より噴出する嫌気状態下に被処理水を膜分離するように構成したものである。

【００１３】また本発明の水処理装置は、有機性排水を好気性槽と嫌気性槽とにおいて処理した生物処理水を膜分離するように構成したものである。上記した構成によれば．処理槽の内部において、膜カートリッジにより被処理水を膜分離しつつ、その膜面を膜面洗浄用気体により洗浄する際に．槽内の排ガスが循環手段により散気手段に循環供給され、排ガスを含んだ膜面洗浄用気体が散気手段より噴出することによって嫌気状態すなわち低酸素状態が実現される。したがって、膜面洗浄は従来通りの曝気強度で行いながら．多量の酸素の存在下では不都

合が生じる被処理水の膜分離を行うことができる。

【0014】上記したように曝気強度を低減することなく嫌気状態を実現できるので、生物処理水を膜分離する際に起こり易いNOxの増大を防止できる。また、完全嫌気状態下で起こり易いNH，－Nの溶出も防止できる。

【0015】

【発明の実施の形態】以下、本発明の実施形態を説明する。図1および図2において、し尿等の有機性排水を処理する水処理設備21は、硝化・脱窒を行う深層反応槽22と膜原水槽23とを備えている。

【0016】深層反応槽22は、下降流路24と上昇流路25とを形成するチューブ26と、循環ポンプ27を介装した循環流路28と、下降流路24の内部に空気を吹き込む給気手段29とを備え、高濃度の活性汚泥を内部に維持しており、原水供給管30により有機性排水を間欠または連続導入して、循環流路28と下降流路24と上昇流路25とにわたり流動させ、下降流路24内を下降する有機性排水に過不足なく空気を供給するようになっている。

【0017】膜原水槽23は、前段に配置した好気性槽31と、中段に配置した嫌気性槽32と、後段に配置した膜分離槽33と、最終段に配置したポンプ槽34とからなり、深層反応槽22において処理され送液管35により送給される一次処理水を導入する。そして、この一次処理水を好気性槽31、嫌気性槽32、膜分離槽33に順次導いて処理し、膜分離槽33における透過液は二次処理水として系外へ流出させ、残留物はポンプ槽34に一旦貯留した後、返送汚泥および余剰汚泥として送液管36により深層反応槽22および系外に送るようになっている。各槽31，32，33，34内の下部には、槽外のブロワ37，38に連通する散気管39，40，41，42が設けられており、各散気管39，40，41，42より、各槽31，32，33，34に応じたパターンで散気される。

【0018】膜分離槽33は、図2に示したようなものであり、密閉式の槽体43の内部に、膜カートリッジ44を配列した膜分離装置45を設け、槽内上部空間をブロワ38の吸引側に連通させる吸引管46を設けている。

【0019】膜分離装置45は、図3および図4を用いて説明したような従来のものと同様の構成を有しているので詳細な説明を省略するが、膜カートリッジ44の透過水流路に連通する透過水管47を備えるとともに、膜カートリッジ44の下方に、上記した散気管41を備えている。散気管41は送気管48によりブロワ38の吐出側に連通している。

【0020】ブロワ38の吸引口および吸引管46には、流量調節弁38a，46aが設けられている。以下、上記した構成における作用を説明する。

【0021】原水供給管30により深層反応槽22の内部に有機性排水を間欠または連続投入し、投入した有機性排水を循環ポンプ27の駆動により循環流路28と下降流路24と上昇流路25とにわたり流動させ、下降流路24内を下降する有機性排水に給気手段29により空気を吹き込む。これにより、有機性排水が槽内に高濃度に維持された活性汚泥と十分接触するとともに、吹き込まれた空気中の酸素が下降流路24内を下降する間に高効率で有機性排水中に溶解し、有機性排水中のNH，－N等は十分量の酸素が存在する好気状態下に活性汚泥により硝化される。

【0022】次いで、給気手段29を停止して、空気を吹き込むことなく有機性排水を循環流路28と下降流路24と上昇流路25とにわたり流動させることにより、有機性排水中のNO，－N等は酸素濃度の低い嫌気的状態下で活性汚泥によりN_2まで還元・脱窒され、それに伴いBODが分解される。

【0023】そして、このようにして深層反応槽22内で高効率にかつ安定に硝化・脱窒およびBODの除去がなされた一次処理水が、活性汚泥を含んだ状態で、送液管35により膜原水槽23の好気性槽31に送られる。

【0024】好気性槽31に流入した一次処理水31aは、散気管39より空気が連続供給される好気状態下に、残存するNH，－N等が活性汚泥により硝化され、嫌気性槽32へと流出する。

【0025】嫌気性槽32に流入した硝化処理水32aは、散気管40より空気が間欠供給される嫌気状態下に、残存するNO，－N等が活性汚泥により還元・脱窒され、膜分離槽33へと流出する。なお、空気の間欠供給は、活性汚泥が沈殿するのを防止する程度の間隔および強度で行われる。

【0026】膜分離槽33に流入した脱窒処理水33aは、膜分離装置45に配列された膜カートリッジ44により膜分離され、活性汚泥などの懸濁物は槽内に残留し、透過液は透過水管47により系外へ送られる。

【0027】このとき、膜カートリッジ44は、散気管41より連続的に噴出する膜面洗浄用気体により膜面洗浄されていて、膜面への懸濁物の堆積が防止される状態において脱窒処理水33aの膜分離が好適に行われる。

【0028】なおこのとき、槽内上部空間に滞留する併ガスが吸引管46を通じてブロワ38の吸引側に送られ、必要に応じて空気を混入した後に散気管41に供給されており、これにより、膜面洗浄に必要な曝気強度は確保されながら槽内は低酸素状態に維持される。この結果、空気など、多量の酸素を含んだ気体を膜面洗浄用気体として生物処理水を膜分離する従来の方法では起こり易かったNOxの増大が防止される。また、完全嫌気状態下で起こり易いNH，－Nの溶出も防止される。

【0029】また、膜分離槽33への脱窒処理水33aの流入量が変動したときには、膜面洗浄用気体中に混入

5

させる空気の割合を変更することで酸素濃度が調節され．ＮＯｘの増大やＮＨ，－Ｎの溶出が防止される。

【００３０】そして、膜分離槽３３において膜分離され．ポンプ槽３４に流入した活性汚泥３４ａは．散気管４２より空気が連続供給される好気状態下で貯留された後．返送汚泥と一部は余剰汚泥として送液管３６を通じて深層反応槽２２および系外へ送られる。

【００３１】なお、上記においては．有機膜過膜を設けた平板状膜カートリッジを例に挙げて説明したが．膜面洗浄用気体を用いる同様の装置であれば上記した構成を適用することができ、たとえば管状あるいは平板状のセラミック膜を処理槽の内部に設けた水処理装置も本発明の範囲に含まれる。

【００３２】

【発明の効果】以上のように、本発明によれば．処理槽内の排ガスを循環供給して．排ガスを含んだ膜面洗浄用気体を噴出させるようにしたので、膜面洗浄に必要な曝気強度を確保しながら嫌気状態を実現することができ、多量の酸素の存在下では不都合が生じる被処理水の膜分離を好適に行える。被処理水の流入量の変動にも．膜面洗浄用気体中に混入させる空気の割合を変えることで対応できる。

6

＊【００３３】このように．曝気強度を確保しながら嫌気状態を実現できるので、生物処理水などを膜分離する際に起こり易いＮＯｘの増大を防止することができ．完全嫌気状態下で起こり易いＮＨ，－Ｎの溶出も防止できる。

【図面の簡単な説明】

【図１】本発明の一実施形態の水処理装置が組み込まれた水処理設備の全体構成を示した説明図である。

【図２】図１に示した水処理装置の全体構成図である。

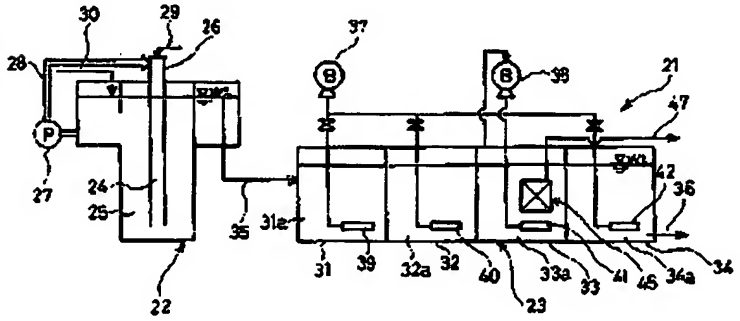
【図３】従来の水処理装置の構成を示した説明図である。

【図４】図３に示した水処理装置の内部に設置された膜分離装置の全体構成図である。

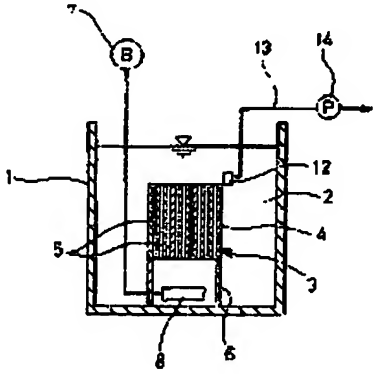
【符号の説明】

22	深層反応槽
33	膜分離槽
33a	脱窒処理水
38	ブロワ
41	散気管
43	槽体
44	膜カートリッジ
46	吸引管

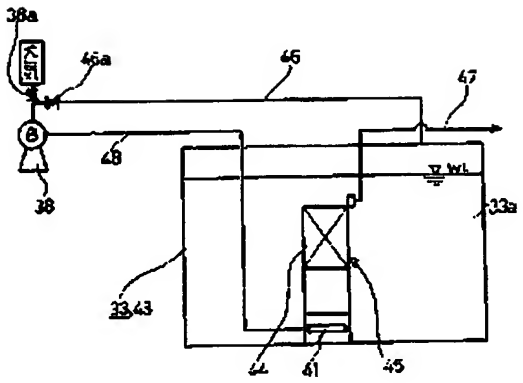
【図１】



【図３】

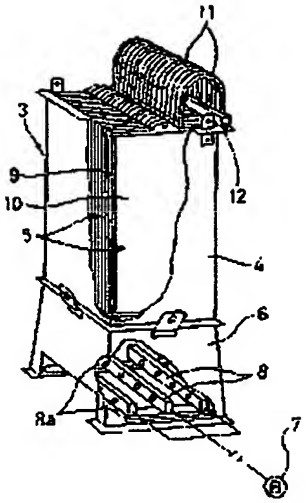


【図2】



22　生物反応槽
33　膜分離槽
33a　処理水
38　ブロワ
41　散気管
43　槽体
44　膜カートリッジ
46　吸引管

【図4】



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the water treatment equipment which prepared the film cartridge which carries out membrane separation of the processed water in the interior of a processing tub, and established an aeration means to spout the gas for film surface washing under the film cartridge Water treatment equipment characterized by having formed said processing tub in the direct vent system, having established the circulation means which carries out circulation supply of the exhaust gas which piles up in the up space in a tub at an aeration means, and constituting so that membrane separation of the processed water may be carried out to the bottom of the anaerobic condition which the gas for film surface washing containing exhaust gas spouts from an aeration means.
[Claim 2] Water treatment equipment according to claim 1 characterized by being what carries out membrane separation of the biological treatment water which processed organic waste water in the aerobic tub and the anaerobic tub.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the water treatment equipment which prepared the film cartridge which carries out membrane separation of the processed water in the interior of a processing tub.
[0002]
[Description of the Prior Art] For example, in the water treatment plant which processes organic waste water, such as nightsoil, as shown in drawing 3 and drawing 4 , the membrane separation device 3 which carries out membrane separation of the processed water 2 is installed in the interior of the processing tub 1.
[0003] The membrane separation device 3 is constituted by arranging the plate-like film cartridge 5 to juxtaposition at suitable spacing inside the box-like film case 4 in which the upper and lower sides carried out opening, arranging the powder trachea 8 which was open for free passage in sources of air supply, such as the blower 7 besides a tub, inside the box-like aeration case 6 in which the upper and lower sides similarly carried out opening, and arranging the film case 4 and the aeration case 6 of each other up and down inside.
[0004] The film cartridge 5 arranges the organic filtration membrane 10 on both the front faces of a filter plate 9, forms in a filter plate 9 the permeated water passage (not shown) which is open for free passage between a filter plate 9 and a filtration membrane 10, and is constituted by forming the attraction tube 11 and the catchment tubing 12 which are open for free passage to permeated water passage. And attraction means, such as the permeated water tubing 13 and a suction pump 14, are established so that it may be open for free passage in the catchment tubing 12.
[0005] In such a configuration, in case membrane separation of the processed water 2 is carried out with a membrane separation device 3 By carrying out the load of the suction force to the permeated water passage of the film cartridge 5 through the permeated water tubing 13, the catchment tubing 12, and the attraction tube 11 with a suction pump 14 Or by making the water head of upper processed water 2 into filtration driving pressure from the film cartridge 5 Suspended solids, such as active sludge contained in processed water 2, were caught by the filtration membrane 10, and the permeated water which penetrated the filtration membrane 10 and flowed in permeated water passage is taken out to the exterior of the processing tub 1 through the attraction tube 11, the catchment tubing 12, and the permeated water tubing 13.
[0006] At this time, aeration is carried out through powder pore 8a of the powder trachea 8 by the blower 7, the vapor-liquid mixing upflow which occurs with the air bubbles of aeration air is made to flow into the gap between the film cartridge 5 and 5, the whole film surface of the film cartridge 5 is ****(ed) to homogeneity, and it has prevented that a cake layer deposits on the front face of a filtration membrane 10.
[0007]
[Problem(s) to be Solved by the Invention] However, aeration reinforcement required for film surface washing is 3 / m3 5m. Since it is high, in carrying out membrane separation of the processed water containing nitrogen, such as biological treatment water which finished biological treatment Since NH4-N which exists in processed underwater one oxidizes and NOx tends to increase from aeration air by the oxygen which dissolved in processed underwater one, it is necessary to carry out denitrification processing, pouring in the methanol as a source of hydrogen.
[0008] Moreover, since aeration reinforcement for film surface washing cannot be reduced even if the inflow of the processed water to a processing tub decreases, NOx will increase like the above and water quality

deteriorates.
[0009] Then, although it is possible to carry out film surface washing with the gas of oxygen non-**, since NOx which exists in processed underwater one will be returned and NH4-N will be eluted if it is made a perfect anaerobic condition, it is required to use the gas containing about 8 - 10% of oxygen.
[0010] Although occurring a tub incycloduction time stream with an agitator, and carrying out film surface washing is also considered, since an agitator is not enough as the effectiveness to which a film surface cleaning effect and processed underwater nitrogen are made to emit, film surface washing with the gas which contained oxygen for the above-mentioned reason is required of it.
[0011] This invention solves the above-mentioned technical problem, and faces it that gases, such as air, wash the film surface of a film cartridge, and the gas of the hypoxia concentration which buildup of NOx or NH4-N does not produce in processed underwater one can be supplied, and it aims at offering the water treatment equipment which can change an oxygen density also to fluctuation of the inflow of processed water, without changing aeration reinforcement.
[0012]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the water treatment equipment of this invention In the water treatment equipment which prepared the film cartridge which carries out membrane separation of the processed water in the interior of a processing tub, and established an aeration means to spout the gas for film surface washing under the film cartridge Said processing tub is formed in a direct vent system, and the circulation means which carries out circulation supply of the exhaust gas which piles up in the up space in a tub at an aeration means is established, and it constitutes so that membrane separation of the processed water may be carried out to the bottom of the anaerobic condition which the gas for film surface washing containing exhaust gas spouts from an aeration means.
[0013] Moreover, the water treatment equipment of this invention is constituted so that membrane separation of the biological treatment water which processed organic waste water in the aerobic tub and the anaerobic tub may be carried out. In case the gas for film surface washing washes the film surface in the interior of a processing tub according to the above-mentioned configuration, carrying out membrane separation of the processed water by the film cartridge, circulation supply of the exhaust gas in a tub is carried out by the circulation means at an aeration means, and when the gas for film surface washing containing exhaust gas spouts from an aeration means, an anaerobic condition, i.e., a hypoxia condition, is realized. Therefore, under existence of a lot of oxygen, membrane separation of the processed water which inconvenience produces can be performed, performing film surface washing by aeration reinforcement as usual.
[0014] Since an anaerobic condition can be realized without reducing aeration reinforcement as described above, the buildup of NOx which is easy to take place in case membrane separation of the biological treatment water is carried out can be prevented. Moreover, the elution of NH4-N which is easy to take place under a perfect anaerobic condition can also be prevented.
[0015]
[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained. drawing 1 and drawing 2 -- the water treatment plant 21 which is and processes organic waste water, such as nightsoil, is equipped with the depths reaction vessel 22 and the film raw water tub 23 which perform nitrification and denitrification.
[0016] The tube 26 with which the depths reaction vessel 22 forms the downward current way 24 and the upflow way 25, Or continuation installation is carried out. the circulating flow way 28 which infixed the circulating pump 27, and the charging means 29 which blows air into the interior of the downward current way 24 -- having -- high-concentration active sludge -- the interior -- maintaining -- **** -- the raw water supply pipe 30 -- organic waste water -- an intermission -- The circulating flow way 28, the downward current way 24, and the lifting passage 25 are made to carry out rear-spring-supporter floating, and air is supplied to the organic waste water which descends the inside of the downward current way 24 the neither more nor less.
[0017] The film raw water tub 23 consists of the aerobic tub 31 arranged in the preceding paragraph, the anaerobic tub 32 arranged to the middle, a membrane-separation tub 33 arranged in the latter part, and a pump tub 34 arranged in the last stage, and introduces the primary-treatment water which is processed in the depths reaction vessel 22 and fed with the liquid-sending tubing 35. And lead this primary-treatment water to the aerobic tub 31, the anaerobic tub 32, and the membrane-separation tub 33 one by one, process it, and the

transparency liquid in the membrane-separation tub 33 is made to flow out out of a system as a secondary effluent, and once storing the residue in the pump tub 34, it is sent out of the depths reaction vessel 22 and a system with the liquid-sending tubing 36 as a return sludge and excess sludge. The powder tracheae 39, 40, 41, and 42 which are open for free passage to the blowers 37 and 38 besides a tub are formed in the lower part in each tubs 31, 32, and 33 and 34, and aeration is carried out to it by the pattern according to each tubs 31, 32, 33, and 34 from each powder tracheae 39, 40, 41, and 42.

[0018] The membrane-separation tub 33 is a thing as shown in drawing 2 , formed the membrane separation device 45 which arranged the film cartridge 44 in the interior of the tank 43 of a direct vent system, and has formed the siphon 46 which makes the up space in a tub open for free passage to the attraction side of a blower 38.

[0019] Since the membrane separation device 45 has the same configuration as the conventional thing which was explained using drawing 3 and drawing 4 , it omits detailed explanation, but it is equipped with the powder trachea 41 which the film cartridge 44 described above caudad while it is equipped with the permeated water tubing 47 which is open for free passage to the permeated water passage of the film cartridge 44. The powder trachea 41 is open for free passage to the discharge side of a blower 38 with the airpipe 48.

[0020] Flow control valves 38a and 46a are formed in attraction opening and the siphon 46 of a blower 38. Hereafter, the operation in the above-mentioned configuration is explained.

[0021] Carry out inside the depths reaction vessel 22 with the raw water supply pipe 30, the circulating flow way 28, the downward current way 24, and the lifting passage 25 are made to carry out rear-spring-supporter floating of an intermission or the supplied organic waste water which carried out the continuation charge for organic waste water by actuation of a circulating pump 27, and air is blown into the organic waste water which descends the inside of the downward current way 24 with the charging means 29. While organic waste water contacts enough by this the active sludge maintained by high concentration in the tub, while the oxygen in the blown air descends the inside of the downward current way 24, it dissolves into organic waste water with a well head, and NH4-N in organic waste water etc. is nitrified by active sludge under the aerobic condition in which the oxygen of an amount exists enough.

[0022] subsequently, the thing made for the circulating flow way 28, the downward current way 24, and the lifting passage 25 to carry out rear-spring-supporter floating of the organic waste water, without stopping the charging means 29 and blowing air -- the bottom of the aversion-condition of an oxygen density that NO3-N in organic waste water etc. is low -- active sludge -- N2 up to -- it is carried out reduction and denitrification and BOD is decomposed in connection with it.

[0023] And it does in this way, and efficient within the depths reaction vessel 22, the primary-treatment water with which it was unstable of clearance of nitrification, denitrification, and BOD is sent to the aerobic tub 31 of the film raw water tub 23 with the liquid-sending tubing 35, where active sludge is included.

[0024] From the powder trachea 39, NH4-N which remains is nitrified by active sludge and primary-treatment water 31a which flowed into the aerobic tub 31 flows into the bottom of the aerobic condition by which continuation supply of the air is carried out to the anaerobic tub 32.

[0025] NO3-N which remains is carried out reduction and denitrification with active sludge, and nitrification treated water 32a which flowed into the anaerobic tub 32 flows into the bottom of the anaerobic condition by which intermittent supply of the air is carried out from the powder trachea 40 to the membrane-separation tub 33. In addition, intermittent supply of air is performed by spacing and reinforcement of extent which prevent that active sludge precipitates.

[0026] Membrane separation of the denitrification treated water 33a which flowed into the membrane-separation tub 33 is carried out by the film cartridge 44 arranged by the membrane separation device 45, suspended solids, such as active sludge, remain in a tub, and transparency liquid is sent out of a system with the permeated water tubing 47.

[0027] At this time, film surface washing of the film cartridge 44 is carried out by the gas for film surface washing spouted more nearly continuously than the powder trachea 41, and membrane separation of denitrification treated water 33a is suitably performed in the condition that deposition of the suspended solid to a film surface is prevented.

[0028] In addition, at this time, after the exhaust gas which piles up in the up space in a tub is sent to the attraction side of a blower 38 through the siphon 46 and mixes air if needed, the powder trachea 41 is

supplied, and while aeration reinforcement required for film surface washing is secured by this, the inside of a tub is maintained by the hypoxia condition. Consequently, by the conventional approach of carrying out membrane separation of the biological treatment water by making the gas containing a lot of oxygen, such as air, into the gas for film surface washing, the buildup of NOx which was easy to take place is prevented. Moreover, the elution of NH4-N which is easy to take place under a perfect anaerobic condition is also prevented.

[0029] Moreover, when the inflow of denitrification treated water 33a to the membrane-separation tub 33 is changed, an oxygen density is adjusted by changing the rate of the air made to mix into the gas for film surface washing, and buildup of NOx and elution of NH4-N are prevented.

[0030] And membrane separation is carried out in the membrane-separation tub 33, and after active sludge 34a which flowed into the pump tub 34 is stored from the powder trachea 42 under the aerobic condition by which continuation supply of the air is carried out, a return sludge and a part are sent out of the depths reaction vessel 22 and a system through the liquid-sending tubing 36 as excess sludge.

[0031] In addition, in the above, although the plate-like film cartridge which prepared the organic filtration membrane was mentioned as the example and explained, the water treatment equipment which could apply the configuration described above when it was the same equipment using the gas for film surface washing, for example, prepared the tubular or plate-like ceramic film in the interior of a processing tub is also contained in the range of this invention.

[0032]

[Effect of the Invention] As mentioned above, since it was made to gush the gas for film surface washing which carried out circulation supply of the exhaust gas in a processing tub, and contained exhaust gas according to this invention, an anaerobic condition can be realized securing aeration reinforcement required for film surface washing, and membrane separation of the processed water which inconvenience produces can be suitably performed under existence of a lot of oxygen. It can respond also to fluctuation of the inflow of processed water by changing the rate of the air made to mix into the gas for film surface washing.

[0033] Thus, since an anaerobic condition is realizable, securing aeration reinforcement, the buildup of NOx which is easy to take place in case membrane separation of the biological treatment water etc. is carried out can be prevented, and the elution of NH4-N which is easy to take place under a perfect anaerobic condition can also be prevented.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the water treatment equipment which prepared the film cartridge which carries out membrane separation of the processed water in the interior of a processing tub.

[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] For example, in the water treatment plant which processes organic waste water, such as nightsoil, as shown in drawing 3 and drawing 4 , the membrane separation device 3 which carries out membrane separation of the processed water 2 is installed in the interior of the processing tub 1.
[0003] The membrane separation device 3 is constituted by arranging the plate-like film cartridge 5 to juxtaposition at suitable spacing inside the box-like film case 4 in which the upper and lower sides carried out opening, arranging the powder trachea 8 which was open for free passage in sources of air supply, such as the blower 7 besides a tub, inside the box-like aeration case 6 in which the upper and lower sides similarly carried out opening, and arranging the film case 4 and the aeration case 6 of each other up and down inside.
[0004] The film cartridge 5 arranges the organic filtration membrane 10 on both the front faces of a filter plate 9, forms in a filter plate 9 the permeated water passage (not shown) which is open for free passage between a filter plate 9 and a filtration membrane 10, and is constituted by forming the attraction tube 11 and the catchment tubing 12 which are open for free passage to permeated water passage. And attraction means, such as the permeated water tubing 13 and a suction pump 14, are established so that it may be open for free passage in the catchment tubing 12.
[0005] In such a configuration, in case membrane separation of the processed water 2 is carried out with a membrane separation device 3 By carrying out the load of the suction force to the permeated water passage of the film cartridge 5 through the permeated water tubing 13, the catchment tubing 12, and the attraction tube 11 with a suction pump 14 Or by making the water head of upper processed water 2 into filtration driving pressure from the film cartridge 5 Suspended solids, such as active sludge contained in processed water 2, were caught by the filtration membrane 10, and the permeated water which penetrated the filtration membrane 10 and flowed in permeated water passage is taken out to the exterior of the processing tub 1 through the attraction tube 11, the catchment tubing 12, and the permeated water tubing 13.
[0006] At this time, aeration is carried out through powder pore 8a of the powder trachea 8 by the blower 7, the vapor-liquid mixing upflow which occurs with the air bubbles of aeration air is made to flow into the gap between the film cartridge 5 and 5, the whole film surface of the film cartridge 5 is ****(ed) to homogeneity, and it has prevented that a cake layer deposits on the front face of a filtration membrane 10.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, since it was made to gush the gas for film surface washing which carried out circulation supply of the exhaust gas in a processing tub, and contained exhaust gas according to this invention, an anaerobic condition can be realized securing aeration reinforcement required for film surface washing, and membrane separation of the processed water which inconvenience produces can be suitably performed under existence of a lot of oxygen. It can respond also to fluctuation of the inflow of processed water by changing the rate of the air made to mix into the gas for film surface washing.
[0033] Thus, since an anaerobic condition is realizable, securing aeration reinforcement, the buildup of NOx which is easy to take place in case membrane separation of the biological treatment water etc. is carried out can be prevented, and the elution of NH4-N which is easy to take place under a perfect anaerobic condition can also be prevented.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, aeration reinforcement required for film surface washing is 3 / m3 5m. Since it is high, in carrying out membrane separation of the processed water containing nitrogen, such as biological treatment water which finished biological treatment Since NH4-N which exists in processed underwater one oxidizes and NOx tends to increase from aeration air by the oxygen which dissolved in processed underwater one, it is necessary to carry out denitrification processing, pouring in the methanol as a source of hydrogen.

[0008] Moreover, since aeration reinforcement for film surface washing cannot be reduced even if the inflow of the processed water to a processing tub decreases, NOx will increase like the above and water quality deteriorates.

[0009] Then, although it is possible to carry out film surface washing with the gas of oxygen non-**, since NOx which exists in processed underwater one will be returned and NH4-N will be eluted if it is made a perfect anaerobic condition, it is required to use the gas containing about 8 - 10% of oxygen.

[0010] Although occurring a tub incycloduction time stream with an agitator, and carrying out film surface washing is also considered, since an agitator is not enough as the effectiveness to which a film surface cleaning effect and processed underwater nitrogen are made to emit, film surface washing with the gas which contained oxygen for the above-mentioned reason is required of it.

[0011] This invention solves the above-mentioned technical problem, and faces it that gases, such as air, wash the film surface of a film cartridge, and the gas of the hypoxia concentration which buildup of NOx or NH4-N does not produce in processed underwater one can be supplied, and it aims at offering the water treatment equipment which can change an oxygen density also to fluctuation of the inflow of processed water, without changing aeration reinforcement.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the water treatment equipment of this invention In the water treatment equipment which prepared the film cartridge which carries out membrane separation of the processed water in the interior of a processing tub, and established an aeration means to spout the gas for film surface washing under the film cartridge Said processing tub is formed in a direct vent system, and the circulation means which carries out circulation supply of the exhaust gas which piles up in the up space in a tub at an aeration means is established, and it constitutes so that membrane separation of the processed water may be carried out to the bottom of the anaerobic condition which the gas for film surface washing containing exhaust gas spouts from an aeration means.

[0013] Moreover, the water treatment equipment of this invention is constituted so that membrane separation of the biological treatment water which processed organic waste water in the aerobic tub and the anaerobic tub may be carried out. In case the gas for film surface washing washes the film surface in the interior of a processing tub according to the above-mentioned configuration, carrying out membrane separation of the processed water by the film cartridge, circulation supply of the exhaust gas in a tub is carried out by the circulation means at an aeration means, and when the gas for film surface washing containing exhaust gas spouts from an aeration means, an anaerobic condition, i.e., a hypoxia condition, is realized. Therefore, under existence of a lot of oxygen, membrane separation of the processed water which inconvenience produces can be performed, performing film surface washing by aeration reinforcement as usual.

[0014] Since an anaerobic condition can be realized without reducing aeration reinforcement as described above, the buildup of NOx which is easy to take place in case membrane separation of the biological treatment water is carried out can be prevented. Moreover, the elution of NH4-N which is easy to take place under a perfect anaerobic condition can also be prevented.

[0015]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained. drawing 1 and drawing 2 -- the water treatment plant 21 which is and processes organic waste water, such as nightsoil, is equipped with the depths reaction vessel 22 and the film raw water tub 23 which perform nitrification and denitrification.

[0016] The tube 26 with which the depths reaction vessel 22 forms the downward current way 24 and the upflow way 25, Or continuation installation is carried out. the circulating flow way 28 which infixed the circulating pump 27, and the charging means 29 which blows air into the interior of the downward current way 24 -- having -- high-concentration active sludge -- the interior -- maintaining -- **** -- the raw water supply pipe 30 -- organic waste water -- an intermission -- The circulating flow way 28, the downward current way 24, and the lifting passage 25 are made to carry out rear-spring-supporter floating, and air is supplied to the organic waste water which descends the inside of the downward current way 24 the neither more nor less.

[0017] The film raw water tub 23 consists of the aerobic tub 31 arranged in the preceding paragraph, the anaerobic tub 32 arranged to the middle, a membrane-separation tub 33 arranged in the latter part, and a pump tub 34 arranged in the last stage, and introduces the primary-treatment water which is processed in the depths reaction vessel 22 and fed with the liquid-sending tubing 35. And lead this primary-treatment water to the aerobic tub 31, the anaerobic tub 32, and the membrane-separation tub 33 one by one, process it, and the transparency liquid in the membrane-separation tub 33 is made to flow out out of a system as a secondary effluent, and once storing the residue in the pump tub 34, it is sent out of the depths reaction vessel 22 and a

system with the liquid-sending tubing 36 as a return sludge and excess sludge. The powder tracheae 39, 40, 41, and 42 which are open for free passage to the blowers 37 and 38 besides a tub are formed in the lower part in each tubs 31, 32, and 33 and 34, and aeration is carried out to it by the pattern according to each tubs 31, 32, 33, and 34 from each powder tracheae 39, 40, 41, and 42.

[0018] The membrane-separation tub 33 is a thing as shown in drawing 2 , formed the membrane separation device 45 which arranged the film cartridge 44 in the interior of the tank 43 of a direct vent system, and has formed the siphon 46 which makes the up space in a tub open for free passage to the attraction side of a blower 38.

[0019] Since the membrane separation device 45 has the same configuration as the conventional thing which was explained using drawing 3 and drawing 4 , it omits detailed explanation, but it is equipped with the powder trachea 41 which the film cartridge 44 described above caudad while it is equipped with the permeated water tubing 47 which is open for free passage to the permeated water passage of the film cartridge 44. The powder trachea 41 is open for free passage to the discharge side of a blower 38 with the airpipe 48.

[0020] Flow control valves 38a and 46a are formed in attraction opening and the siphon 46 of a blower 38. Hereafter, the operation in the above-mentioned configuration is explained.

[0021] Carry out inside the depths reaction vessel 22 with the raw water supply pipe 30, the circulating flow way 28, the downward current way 24, and the lifting passage 25 are made to carry out rear-spring-supporter floating of an intermission or the supplied organic waste water which carried out the continuation charge for organic waste water by actuation of a circulating pump 27, and air is blown into the organic waste water which descends the inside of the downward current way 24 with the charging means 29. While organic waste water contacts enough by this the active sludge maintained by high concentration in the tub, while the oxygen in the blown air descends the inside of the downward current way 24, it dissolves into organic waste water with a well head, and NH4-N in organic waste water etc. is nitrified by active sludge under the aerobic condition in which the oxygen of an amount exists enough.

[0022] subsequently, the thing made for the circulating flow way 28, the downward current way 24, and the lifting passage 25 to carry out rear-spring-supporter floating of the organic waste water, without stopping the charging means 29 and blowing air -- the bottom of the aversion-condition of an oxygen density that NO3-N in organic waste water etc. is low -- active sludge -- N2 up to -- it is carried out reduction and denitrification and BOD is decomposed in connection with it.

[0023] And it does in this way, and efficient within the depths reaction vessel 22, the primary-treatment water with which it was unstable of clearance of nitrification, denitrification, and BOD is sent to the aerobic tub 31 of the film raw water tub 23 with the liquid-sending tubing 35, where active sludge is included.

[0024] From the powder trachea 39, NH4-N which remains is nitrified by active sludge and primary-treatment water 31a which flowed into the aerobic tub 31 flows into the bottom of the aerobic condition by which continuation supply of the air is carried out to the anaerobic tub 32.

[0025] NO3-N which remains is carried out reduction and denitrification with active sludge, and nitrification treated water 32a which flowed into the anaerobic tub 32 flows into the bottom of the anaerobic condition by which intermittent supply of the air is carried out from the powder trachea 40 to the membrane-separation tub 33. In addition, intermittent supply of air is performed by spacing and reinforcement of extent which prevent that active sludge precipitates.

[0026] Membrane separation of the denitrification treated water 33a which flowed into the membrane-separation tub 33 is carried out by the film cartridge 44 arranged by the membrane separation device 45, suspended solids, such as active sludge, remain in a tub, and transparency liquid is sent out of a system with the permeated water tubing 47.

[0027] At this time, film surface washing of the film cartridge 44 is carried out by the gas for film surface washing spouted more nearly continuously than the powder trachea 41, and membrane separation of denitrification treated water 33a is suitably performed in the condition that deposition of the suspended solid to a film surface is prevented.

[0028] In addition, at this time, after the exhaust gas which piles up in the up space in a tub is sent to the attraction side of a blower 38 through the siphon 46 and mixes air if needed, the powder trachea 41 is supplied, and while aeration reinforcement required for film surface washing is secured by this, the inside of a tub is maintained by the hypoxia condition. Consequently, by the conventional approach of carrying out

membrane separation of the biological treatment water by making the gas containing a lot of oxygen, such as air, into the gas for film surface washing, the buildup of NOx which was easy to take place is prevented. Moreover, the elution of NH4-N which is easy to take place under a perfect anaerobic condition is also prevented.

[0029] Moreover, when the inflow of denitrification treated water 33a to the membrane-separation tub 33 is changed, an oxygen density is adjusted by changing the rate of the air made to mix into the gas for film surface washing, and buildup of NOx and elution of NH4-N are prevented.

[0030] And membrane separation is carried out in the membrane-separation tub 33, and after active sludge 34a which flowed into the pump tub 34 is stored from the powder trachea 42 under the aerobic condition by which continuation supply of the air is carried out, a return sludge and a part are sent out of the depths reaction vessel 22 and a system through the liquid-sending tubing 36 as excess sludge.

[0031] In addition, in the above, although the plate-like film cartridge which prepared the organic filtration membrane was mentioned as the example and explained, the water treatment equipment which could apply the configuration described above when it was the same equipment using the gas for film surface washing, for example, prepared the tubular or plate-like ceramic film in the interior of a processing tub is also contained in the range of this invention.

[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the explanatory view having shown the whole water treatment plant configuration into which the water treatment equipment of 1 operation gestalt of this invention was built.
[Drawing 2] It is the whole water-treatment-equipment block diagram shown in drawing 1 .
[Drawing 3] It is the explanatory view having shown the configuration of conventional water treatment equipment.
[Drawing 4] It is the whole membrane separation device block diagram installed in the interior of the water treatment equipment shown in drawing 3 .
[Description of Notations]
22 Depths Reaction Vessel
33 Membrane-Separation Tub
33a Denitrification treated water
38 Blower
41 Powder Trachea
43 Tank
44 Film Cartridge
46 Siphon

[Translation done.]

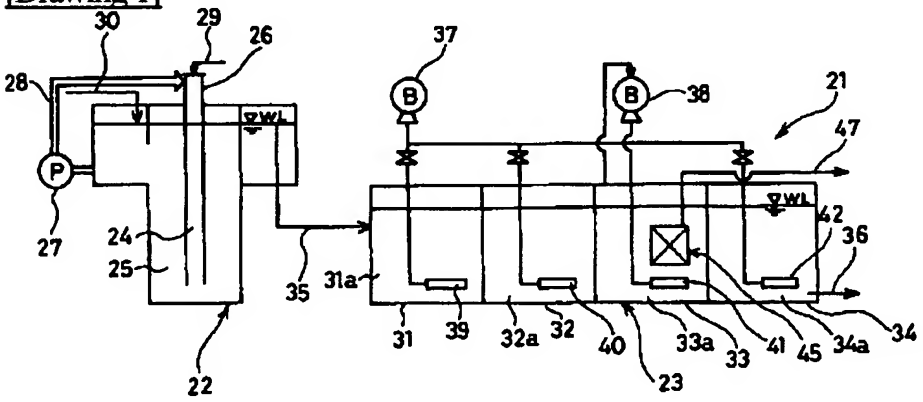
* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

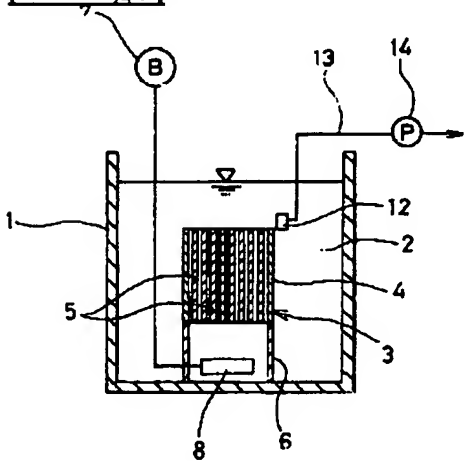
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

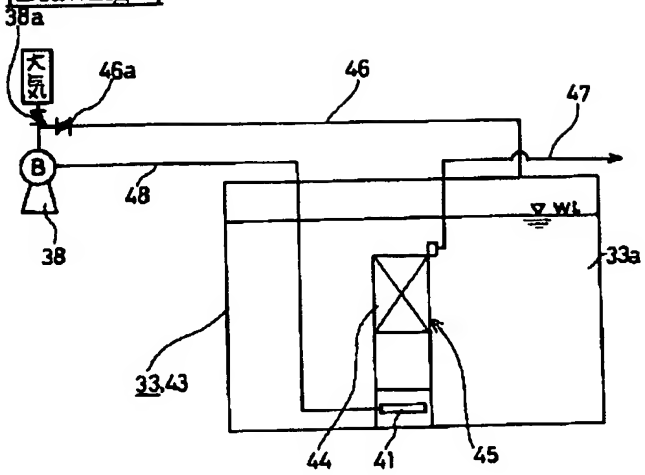
[Drawing 1]



[Drawing 3]

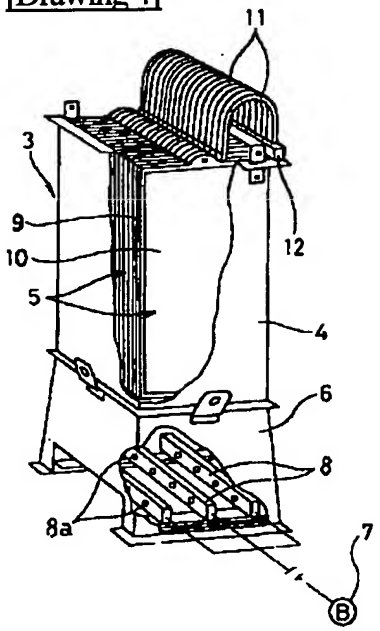


[Drawing 2]



22 深層反応槽
33 膜分離槽
33a 脱窒処理水
38 ブロワ
41 散気管
43 槽体
44 膜カートリッジ
46 吸引管

[Drawing 4]



[Translation done.]